FILED
9-15-16
08:00 AM

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of Pacific Gas and Electric Company for Approval of the Retirement of Diablo Canyon Power Plant, Implementation of the Joint Proposal, And Recovery of Associated Costs Through Proposed Ratemaking Mechanisms (U39E).	Application 16-08-006 (Filed 08/11/2016*)*

PROTEST OF CALIFORNIANS FOR GREEN NUCLEAR POWER

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September 14, 2016

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Introduction

CGNP hereby protests the above-captioned Application ("Application") of Pacific Gas and Electric Company ("PG&E") on multiple grounds. PG&E's Application requests actions outside the jurisdiction of the Commission, and is primarily a public relations effort based on promotional material assembled by the financial consulting firm M.J. Bradley and Associates ("Consultants"), intended to further PG&E's business interests at the expense of California ratepayers and the environment.

Specific Objections

1. Title

The above-captioned title of PG&E's Motion lists three specific aims:

1. Approval of the retirement of Diablo Canyon Power Plant (DCPP)
2. Implementation of the Joint Proposal
3. Recovery of associated costs through proposed ratemaking mechanisms

#1 and #2 referenced above, along with any of the abundant content herein intended to support them, should be struck in their entirety. PG&E does not require Commission approval for retirement of DCPP, thus the request is legally unbinding. The joint proposal referenced herein ("Joint Proposal") is a contract between private entities, and its implementation is thus within the purview of California civil law and outside that of the Commission.

CGNP offers following discussion only as it applies to #3, "Recovery of associated costs through proposed ratemaking mechanisms", which is under the purview of Commission and one which, in the eyes of the California public, represents a solemn responsibility.

2. Claim:

> *"The Joint Parties represent diverse interests but are united in their commitment to helping California achieve its clean energy vision."*

CGNP maintains any diversity of interests in the joint parties ("Joint Parties") referenced herein is secondary to a shared economic interest - that their "clean energy vision" is one at odds with science, with public health, environmental health, California ratepayers, and the health of the California economy. James E. Hansen, Ph.D. and Pushker A. Kharecha, Ph.D. in their 2013 paper provided a mean value of 28.67 deaths per TWH with coal-powered generation and 2.821 deaths per TWH with natural-gas-fired generation. Thus each year, DCPP, with 18 TWH of generation **avoids between 516 and 51 deaths associated with fossil-fuel-fired generation.** This negative externality is not mentioned in PG&E's proposal to shut down DCPP. As noted elsewhere, fossil-fuel-fired generation would replace the needed DCPP power. (CGNP has protested this almost-identical negative externality associated with the January, 2012 shut down by SCE of San Onofre

Nuclear Generating Station (SONGS) in our filings associated with CPUC Proceeding I1210013.)

3. Claim:

> *"Together, the Joint Parties developed a proposal that would increase investment in energy efficiency, renewable resources, and other GHG-free resources while phasing out nuclear power in California in 2024 and 2025."*

CGNP objects to PG&E's nonsensical use of the word "resource", defined as a " a source of supply or support[1]", as a suitable description of energy efficiency - the ability to use less energy to accomplish the same task. CGNP notes the aforementioned proposal of Joint Parties ("Proposal"), as described herein, will phase *out* approximately five times as much GHG-free electricity as it will phase in. PG&E's proposal notes on page 7 that DCPP's typical annual electricity production is more than 18,000 gigaWatt-hours (GWH). On page 31 of 80 of PG&E's proposal, "In the second tranche (Section 2.3), PG&E will be authorized to procure 2,000 GWH of GHG-free energy resources through an all-source solicitation that will commence energy deliveries or add energy efficiency programs or projects to the system in the 2025 to 2030 time period." *Thus, in the best case, PG&E commits to a mere 11% of the GHG-free energy resources that will be added between 2025-2030*.

The replacement GHG-free resources will be extremely costly. CGNP has developed a cost estimate for replacing the 18,000 GWH currently generated by DCPP with solar photovoltaic (PV) energy, using the 9.5 square mile Topaz Solar plant in eastern San Luis Obispo County as the design basis. Topaz Solar cost about $2.4 billion. (Solar's capacity factor is only around 20%, with power output peaking at solar noon, as all California solar power does. The California solar output period does not overlap the late afternoon electricity demand peak. In contrast, DCPP's recent capacity factor is an astounding 91%. Historically, DCPP has been used in conjunction with PG&E's Helms Pumped Storage facility to the east of Fresno in the Sierra foothills to help power northern California through the late afternoon demand peak with the equivalent of approximately 3 GHG-free DCPP power reactors.) Since DCPP annually produces about 14 times the power

[1] http://www.merriam-webster.com/dictionary/resource

generated by Topaz Solar, the capital and land requirements for a massive solar PV plant that produces the same amount of power as DCPP may be readily calculated at $2.4 billion X 14 = **$33.6 billion** and 9.5 square miles X 14 = **133 square miles**. The CPUC would be hard-pressed to justify the replacement of the economical (4 cents/kWH) and reliable "always on" power from DCPP, (which provides both voltage and frequency stability to California's power grid) with a costly boondoggle that destabilizes the grid - and does not produce **any** power when California really needs it.

4. Claim:

> *"This broad coalition of partners with diverse points of view collectively came to a shared vision concerning the best and most responsible path forward for Diablo Canyon. A key element of this vision is the recognition of the value of carbon-free nuclear power as an important bridge strategy over the next eight to nine years. This transition period will help to ensure that power remains affordable and there is no increase in the use of fossil fuels. Equally important, this transition period will also provide essential time needed for PG&E's valued employees and the community to effectively plan for the future."*

What PG&E describes as a "broad coalition of partners" includes no climatologists or science-based opinion with regard to climate change, rendering its views chronically deficient regarding the environmental impacts of closing DCPP. CGNP suggests that a more accurate label for most of the groups listed would be "outside anti-nuclear power agitators," calling into question their standing in this Proceeding. Closure of other nuclear power plants worldwide have been overwhelmingly followed by increases in greenhouse gas ("GHG") emissions, suggesting a more accurate metaphor might be "a bridge to increased emissions." The Proposal accounts for in the best case 20% of the clean electricity to be provided by the date of the proposed closure, making the Proposal equally deficient for meeting California's environmental goals.

5. Claim:

> *The Joint Proposal also addresses community impacts. Diablo Canyon is one of the largest employers, taxpayers, and charitable contributors in the San Luis Obispo County area. In order to further support this local community, the Joint*

Proposal includes continued funding for San Luis Obispo County at current Diablo Canyon property tax levels through 2025.

CGNP celebrates PG&E's magnanimity in volunteering to continue to pay property tax, as it is so required by law.

6. Claim:

"With regard to relicensing costs, the Joint Proposal recognizes that it was reasonable and prudent for PG&E to incur the costs related to the federal and state license renewal processes, which are largely comprised of technical and environmental studies and permitting and licensing costs paid to the NRC. PG&E's relicensing efforts were undertaken to preserve all options during a period of resource planning uncertainty..."

Though CGNP understands how incurring the costs of permitting and relicensing might be reasonable and prudent from a self-serving perspective, there is no possible justification for the company's attempt to shift this burden to consumers who could expect to receive no benefit. It attributes "resource planning uncertainty," while failing to name resources or document any urgency which might warrant remedy from ratepayers. Thus, the company's request is neither reasonable nor in the public interest and should be denied.

7. Claim:

Finally, in order to implement the Joint Proposal, PG&E requests that the Commission approve a new two-way balancing account to track the amortization of Diablo Canyon's net book value and capital additions and implement annual rate adjustments so that the book value is depreciated to zero and the costs are fully recovered in rates by the time Diablo Canyon ceases operations at the expiration of the current NRC operating licenses.

Herein, PG&E is requesting ratepayer compensation for the destruction of a functional, zero-carbon nuclear plant after the company has profited from the plant for decades under a natural monopoly - without significant competition or corresponding financial risk.

Its premature retirement thus constitutes little more than a fraudulent and cynical

manipulation of public trust, and a long-lasting burden on California's economy and its citizens.

8. Claim:

> *"B. As A Result Of The Rapidly Changing California Energy Landscape, Diablo Canyon Will Not Be Needed At The End of the License Period*
>
> *California's electric grid is in the midst of a significant shift that creates challenges for Diablo Canyon in the coming decades. Changes in state policies, the electric generation fleet, and market conditions have combined to reduce the need for large, inflexible baseload power plants. These forces reduce the need for Diablo Canyon's output beyond the current license period. Specifically, PG&E is faced with four primary planning challenges associated with operating Diablo Canyon beyond the current license period."*

CGNP rejects PG&E's implication that DCPP is "inflexible", and asserts that its value as a robust, zero-carbon source of energy has done anything but increase in recent decades.

PG&E fails to consider the scenario wherein Diablo Canyon Power Plant (DCPP) operates flexibly, reliably, and cost effectively to meet future load demands. PG&E herein implies DCPP can only serve as a baseload generator of electricity: one which must operate at constant full power, and thus would be incompatible with the flexible operation required to balance generation from solar and wind resources increases in the future. The word 'baseload' occurs seven times in Application[2] and 15 times in the PG&E Sworn Testimony[3].

This characterization is inconsistent with the fundamental design capabilities of Nuclear Power Plants (NPP) in general and DCPP in particular. DCPP is a four-loop PWR

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[2]Application of Pacific Gas and Electric Company for Approval of the Retirement of Diablo Canyon Power Plant, Implementation of the Joint Proposal, and Recovery of Associated Costs Through Proposed Ratemaking Mechanisms, Application 16-08-006, Filed August 11, 2016.

[3] Prepared Testimony, Retirement of Diablo Canyon Power Plant, Implementation of the Joint Proposal, and Recovery of Associated Costs Through Proposed Ratemaking Mechanisms, Pacific Gas and Electric Company, Application 16-08-006, Filed August 11, 2016.

designed by Westinghouse. As stated in Chapter 16 of the description of the "Westinghouse Pressurized Water Reactor Nuclear Power Plant" [4]:

> *"The (Nuclear Steam Supply System) NSSS and its control system is designed to the following basis:*
>
> 1. *The NSSS is capable of following repetitive load changes automatically throughout the range of 15 percent to 100 percent of rated power consistent with the cyclic nature of the utility system load demand. This capability exists throughout the life of the core.*
> 2. *The NSSS is capable of automatically making step changes in load of 10 percent of rated power and ramp changes of 5 percent of rated power per minute.*
> 3. *The NSSS is capable of following a reference 12-3-6-3 daily load cycle consisting of 12 hours at full power, decreasing load to 50-percent power over a 3 hour period, remaining at 50-percent power for 6 hours and returning to full power over a 3 hour period. This load cycle can be followed daily through all of the fuel cycle."*

It is recognized that these are general design bases, and that each power plant will have its own operating constraints specified in its Operating License, with its Technical Specifications and its Operating Limits. There are numerous examples of PWRs flexibly operating to accommodate variable load demands.

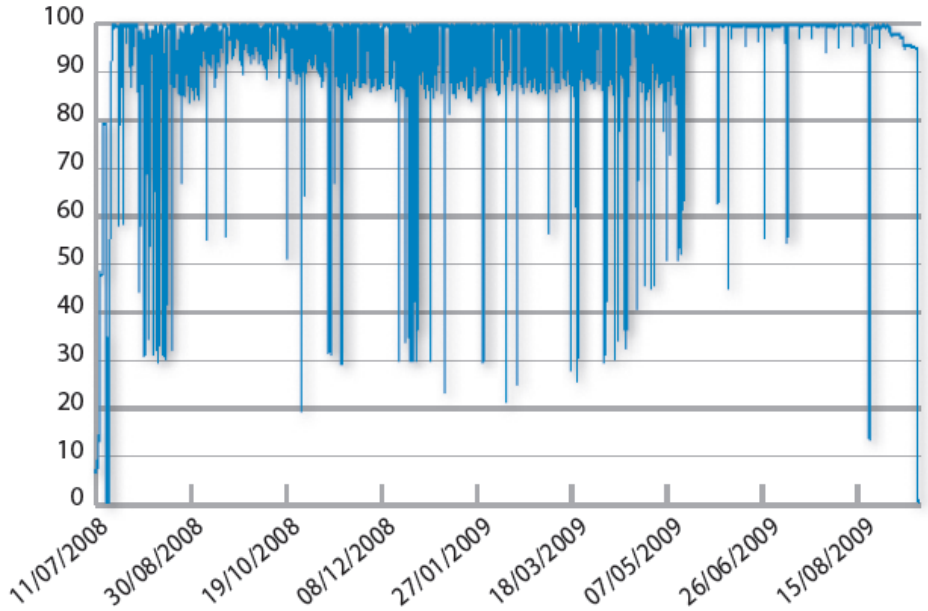
The two reactors at Byron Nuclear Generating Station in Illinois are Westinghouse four-loop pressurized-water reactors (PWRs) similar in design to DCPP, are capable of

[4] The Westinghouse Pressurized Water Reactor Nuclear Power Plant, Westinghouse Electric Corporation Water Reactor Divisions, Pittsburgh, PA, 1984.

operating flexibly, and do so in daily operation[5,6]. On October 29, 2015, Byron 1 operated at 72% capacity and Byron 2 operated at 71%, with both units operating at reduced power for load following. Similar powers were seen for the previous weeks. April 24, 2016 showed Byron 1 at 95% for load following (per load dispatcher) and Byron 2 at 0% for a refueling outage.

In France and Germany flexible NPP operation is much more common. A. Lokhov, in "Load-following With Nuclear Power Plants", provides the following examples of actual power profiles from European reactors[7].

Figure 1: Typical power history during an EDF reactor cycle (in % of rated power)

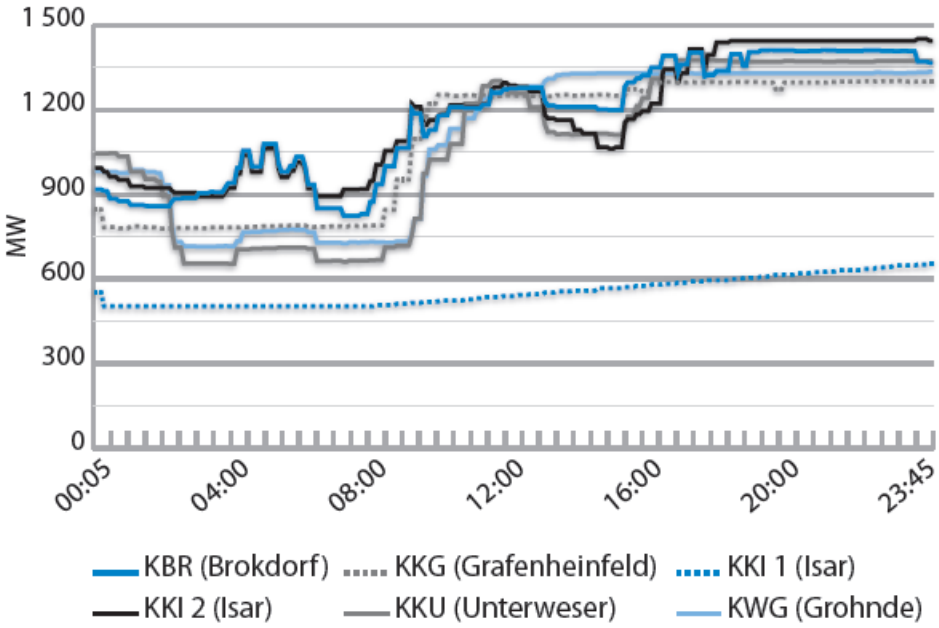


Courtesy of Électricité de France (EDF).

[5] http://www.nrc.gov/reading-rm/doc-collections/event-status/reactor-status/2015/20151029ps.html
[6] http://www.nrc.gov/reading-rm/doc-collections/event-status/reactor-status/2016/20160424ps.html

[7] A. Lokhov, "Load-following with nuclear power plants," NEA Updates, Organisation for Economic Co-operation and Development (OECD) Nuclear Energy Agency (NEA), NEA News 2011 – No. 29.2

Figure 2: Example of load-following during 24 hours at some German nuclear power plants



Courtesy of E.ON Kernkraft.

The author writes:

> *"Most of the currently operating Generation II nuclear reactors were designed to have strong manoeuvring capabilities. Nuclear power plants in France and Germany operate in load-following mode. They participate in the primary and secondary frequency control, and some units follow a variable load programme with one or two large power changes per day. In France, load-following is needed to balance daily and weekly power variations in electricity supply and demand since nuclear energy represents a large share of the national mix. In Germany, load following became important in recent years when a large share of intermittent sources of electricity generation (e.g. wind) was introduced to the national mix*."

He concludes:

"Since most of the currently used nuclear power plants have strong manoeuvrability capabilities in their designs (except for some very old NPPs), there is no or limited impact (within the design margins) of load-following on the acceleration of ageing of large equipment components. However, load following does have some influence on the ageing of certain operational components (e.g. valves), and thus one can expect an increase in maintenance costs. Moreover, for older plants some additional investment could be needed, especially in instrumentation and control, in order to become eligible for operation in load-following mode. Licensing of load-following is specific to each country. In France and in Germany, for instance, load-following is considered early in the licensing process, and no further authorisation needs to be obtained by the utility to operate in manoeuvring regime. In other countries, load-following restrictions apply: for example in the United States, automatic load-following is not authorised."

Utilities in the United States, including PG&E, are well aware of the need to analyze plant-specific issues and obtain NRC approval for operations beyond those authorized in their Operating Licenses. Significant research continues to be performed in the U. S. and abroad in support of the transition of nuclear power plants to flexible operation rather than baseload. A 2014 report from the Electric Power Research Institute provides an excellent overview of the issues[8].

In its testimony PG&E neglects to mention that a portion of the $53 million in ratepayer compensation it is requesting were for technical studies devoted to the issue of possible flexible operation of DCPP in other than a baseload mode. In December 2013, Areva completed a feasibility study on flexible power issues. PG&E then completed a draft report entitled "Facts, Discussions, Options and Recommendations on DCPP's Ability to

[8] Program on Technology Innovation: Approach to Transition Nuclear Power Plants to Flexible Power Operations. EPRI, Palo Alto, CA: 2014. 3002002612.

Implement Flexible Power Operations." These documents are marked "Confidential" and their contents, which are certainly relevant to the possible future operation of DCPP, are not publicly available to be reviewed by concerned stakeholders and the Diablo Canyon Independent Safety Committee (DCISC). Plans to have Areva and Westinghouse conduct a study of possible licensing approaches to obtain approval for flexible operation were cancelled when PG&E unilaterally decided to cancel license renewal activities.

Certainly all options were not preserved, and specifically the possibility of future operations of DCPP in a flexible mode was never considered as part of the Joint Proposal. To support the desires of the Joint Proposal parties to retire DCPP, it was wrongly asserted that DCPP could only operate as a baseload supply, and therefore it should be retired.

Attempts to downplay DCPP's load-following capabilities permeate the Application. Therein, PG&E describes several scenarios which might increase costs of operation of DCPP. There are, however, no countervailing lists of items that could *decrease* costs of operation of DCPP, or could diminish the estimated future supplies of solar or wind power or battery storage capability.

The application fails to consider the possibility of California legislative actions similar to those of New York State (Zero Emissions Credits) to credit nuclear power plants for their emission free generation; environmental impact studies of OTC mitigation measures that find the negative environmental impacts of any mitigation measures far outweigh any benefit of such mitigation; or plant operational efficiencies such as the Westinghouse improved steam generator tube inspection method[9], which shortens outage time by two days with an approximate $2 million savings for each outage, while reducing radioactive waste and worker dose. PG&E cannot claim ignorance of the New York State Zero

[9] STEAM GENERATORS, Improving Tube Inspections, Nuclear News, July 2016, www.ans.org/nn.

Emissions Credits information, as it was timely supplied by CGNP via the PG&E e-mail mechanism provided for community feedback after PG&E's proposal was announced. The CPUC was also informed via simultaneous email transmissions to several relevant email accounts.

The conclusions of the Need Analysis in PG&E's Prepared Testimony are similarly driven by the assumption DCPP is a baseload resource and would not be able to reduce its generation to balance a surplus of electricity from renewable resources. **Thus, there is no basis for concluding that DCPP is incapable of operating in an evolving mix of electricity supplies and changing demand.** There is ample documentation showing that nuclear power plants can operate in a flexible mode that is compatible with large and varying combinations of solar and wind resources. There is no need to shut DCPP down. The economics of flexible operation of DCPP have not been disclosed to ratepayers via the CPUC. Such results should be considered in any discussion of future DCPP operation or shutdown and the potential impact on ratepayers.

Furthermore, if PG&E is unwilling to continue its excellent stewardship of Diablo Canyon Power Plant beyond 2025, it is failing its fiduciary duty to its shareholders - and in its responsibility to the California environment to prematurely shut down the plant far in advance of the end its useful lifetime. Instead of shutting down DCPP, a buyer such as Exelon Nuclear should be identified well in advance of 2025 and in exchange for the payment of billions of dollars, the title should be transferred to the new owner. Such an approach is being utilized for the continued safe operation of FitzPatrick Nuclear Power Plant outside of Oswego, New York.

Until the proposal to which CGNP is protesting was announced to the public on 21 June 2016, PG&E was pursuing NRC license renewal of DCPP to 2045, which suggests a lower bound for the lifetime of the plant. Many plant components were

very conservatively designed to last perhaps a century. The operational history of DCPP plant operations has shown that components even as complex and physically large as steam generators have been economically replaced so that DCPP may continue its safe operation. PG&E has been an industry leader in replacing the analog controls that were part of the original design of DCPP with modern, more robust digital controls.

See, for example the "White Papers" section of the Dana Point, California-based firm Technology Resources at http://www.technology-resources.com/White_Papers.html . Note in particular the DCPP "Digital Process Protection System" which was developed with inputs from PG&E and Technology Resources, among other entities. DCPP is a topic of at least four Technology Resources White Papers. The Google query "Digital Process Protection System" "Diablo Canyon Power Plant" yields about 22 results when the query was executed on 13 September 2016.

5. Section IV: "Description of PG&E's Requests in this Application"

PG&E herein modifies the aims outlined in the title of Application to the procurement of billions of dollars in rate recovery, without any corresponding public obligation to fulfill the terms of Proposal.

Specific requests total $2.13 billion, for which PG&E's ratepayers will be liable. Unspecified are potential ratepayer costs which potentially could total many additional billions of dollars.

Ultimately, all of these charges are the direct result of a self-serving business decision by PG&E - one made solely in its own interest. Thus, there is no justifiable context in which ratepayers should be held accountable. These charges should be assumed by PG&E's shareholders, not California ratepayers.

Dated: September 14, 2016

Respectfully submitted,

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